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AUTOMATED WEB BROWSER SYNCHRONIZATION

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AUTOMATED WEB BROWSER SYNCHRONIZATION

This application claims the benefit of provisional application Number 60/203,146, filed May 9, 2000 under 35
5   U.S.C. Section 119(e).

Field of the Invention

The present invention generally relates to web browsers, and in particular, to automatically
10   synchronizing multiple web browsers.

Background of the Invention

Given the ever-increasing popularity of the Internet and the current state of network technology, both leisure
15   and business users often desire to share and view web pages with one another. Although today's desktop software makes it very easy to email a web page or the web page's uniform resource locater (URL) to one or more parties, the process is relatively slow and undesirable
20   when the parties are engaged in a voice call or real-time, online messaging session. During these sessions, there is currently no way to synchronize the browsers for all of the users party to the call.

Often, users engaged in a real-time communication
25   session are forced to relay a URL to another user, who must retype the desired URL. Verbal communication of web addresses is fraught with misinterpretation and misunderstanding of the URL. Further, relaying and typing URLs during voice or real-time messaging sessions
30   is subject to typographical errors. Alternatively, emailing URLs during communication sessions is very slow and inhibiting. As such, there is a need for a technique that provides for efficiently updating all of the users'

web browsers when any one of the users accesses a new web
page.

Summary of the Invention

5   The present invention allows synchronization of web
browsers to eliminate the need for users to convey
uniform resource locators (URLs) or like location
indicia. The invention operates with a local user's
browser to identify the URL for a newly loaded web page
10   and transmit this newly loaded URL to a remote user's
computer for loading on the remote user's browser.
Further, the invention may also provide for receiving
URLs associated with web pages loaded onto the remote
user's browser and loading the web pages on the local
15   user's browser using the received URLs.

Preferably, a web browser interface device interacts
with the browser to receive URLs originally selected by
the local user and forward these URLs to the remote user.
Similarly, the web browser interface device receives URLs
20   from the remote user and controls the local browser to
load the web page based on the URL from the remote user.
The web browser interface device also facilitates
communication with and between other web browser
interface devices to facilitate the transport of URL or
25   like location indicia between the devices. Preferably,
the web browser interface device interacts with the
associated browser through a standard application
protocol interface (API) and facilitates communications
between the devices using the session initiation protocol
30   (SIP). Further, the invention may be configured to allow
a local user to selectively accept the automatic loading
of a web page associated with the URL sent from the
remote user. Likewise, the local user may selectively
forward the URL associated with newly loaded web pages.

The present invention is well-suited to operate in conjunction with a voice call between the users wherein the respective computers are engaged in a communication session. The URL information may be sent separately from or integrated with voice data during the call. Further, the voice communication may occur over the public switched telephone network or a packet-switched network, such as the Internet. If the voice call is implemented via the users' computers, the URL information may be integrated with the voice call.

Those skilled in the art will appreciate the scope of the present invention and realize additional aspects thereof after reading the following detailed description of the preferred embodiments of the invention in association with the accompanying drawing figures.

Brief Description of the Drawing Figures

Figure 1 is a block representation of an architecture for providing web browser synchronization according to a preferred embodiment of the present invention.

Figure 2 is a block representation outlining the process of establishing a session between a caller and a callee according to a first embodiment of the present invention.

Figure 3 is a block representation outlining the process of establishing a session between a caller and a callee according to a second embodiment of the present invention.

Figure 4 is a flow diagram outlining a browser synchronization process according to a preferred embodiment of the present invention.

Figure 5 is a block representation of a computer according to the present invention.

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like numerals indicate the same elements

5   throughout the several views.

Detailed Description of the Preferred Embodiments

The present invention relates to synchronizing two or more web browsers by automatically pushing and

10   receiving web content between two or more computers engaged in a communication session. Once a session between two or more computers is established, any user may easily and automatically share the current web page that they are viewing with all other users engaged in the

15   session. When the other users receive a URL or other location indicia for the web page, they can have their local web browser automatically load the web page, or optionally, interact with a user interface to choose whether or not to load the web page.

20   The invention is particularly useful when combined with a voice call using techniques as described in pending application serial numbers 09/164,885, entitled "Method and Apparatus for Integrated Multimedia Call Control," filed October 1, 1998, and 09/065,124, entitled

25   "Integrated Telecommunication Collaboration System," filed April 23, 1998, which are incorporated herein by reference. When users are engaged in a voice call or messaging session, the present invention provides the ability to share web pages, URLs, or other web content

30   between computers during the call with no additional setup required other than establishing the call. The invention is equally useful outside of a voice or messaging session, wherein users may synchronize their browsers in the absence of other communications. Even

though the preferred embodiment of the invention as
described below identifies specific protocols and
software technologies, those skilled in the art will
recognize numerous protocols and related technologies

5   that exist and that will be developed that are capable of
carrying out the inventive concepts described herein.

Preferably, the present invention is implemented in
a manner readily compatible with existing browser
applications, such as Microsoft's Internet Explorer and

10   Netscape's Communicator. These and other widely
available browsers support application protocol
interfaces (APIs) that allow external software
applications to control the functions of a local browser
running on the same computer. The API provided by the

15   browsers supports the ability to notify external
applications of URL updates and allows external
applications to automatically control the loading of web
pages by the browser. Since most web browsers are
configured to allow external programs to control their

20   operation, the preferred embodiment of the present
invention incorporates a software application called a
web browser interface device (WBID), which is configured
to cooperate with the web browser through an API.

Turning now to Figure 1, a block representation of

25   two computers 10 engaged in a session according to the
present invention is depicted. The computers may
communicate over any type of network, such as a packet-
switched network supporting the TCP/IP protocol suite.
Preferably, each computer 10 will include a web browser

30   12 having an API 14 cooperating with a WBID 16. The WBID
16 can provide two important functions. The first is to
interact with the associated web browser 12, and the
second is to establish sessions with other WBIDs 16 or
compatible browsers running on remote computers 10. The

API 14 used by the preferred embodiment of the present
invention is Microsoft's Dynamic Data Exchange (DDE) API
available on all Windows-based platforms. A DDE API
provides the ability for Windows-based applications to
5   dynamically exchange information. For example, DDE may
allow a spreadsheet application to dynamically exchange
information with a word processor to ensure that the
corresponding document contains up-to-date information.
Although there are a number of automation APIs that
10   provide the same capability, such as Microsoft's COM
interfaces, most browsers support the DDE API. Dynamic
Data Exchange documentation is readily available
throughout the software industry and from Microsoft
Corporation, Redmond, Washington. The interaction
15   between the WBID 16 and the web browser 12 using a DDE-
based API 14 is described in further detail below.

        Preferably, each WBID 16 has the ability to
establish a session with other WBIDs 16 over a data
network transport of any type. There are numerous
20   protocols for establishing these types of sessions and
any of them are sufficient as long as they are capable of
communicating information from one user to another
according to the concepts described herein. The
preferred embodiment of the invention uses the session
25   initiation protocol (SIP) as described in the Internet
Engineering Task Force's (IETF) RFC2543, which is
incorporated herein by reference in its entirety.

        The WBID may establish sessions using any number of
techniques as will be apparent to those of ordinary skill
30   in the art. With respect to the present invention, it is
important that once a session is established, URL
information or like web page location indicia can be
passed between the WBIDs 16 of the various computers 10
engaged in a session. Prior to describing the details of

web synchronization, two exemplary techniques for establishing sessions between computers 10 using SIP are provided.

Establishing a session between two computers 10 using SIP requires an SIP invitation consisting of two requests, an INVITE request followed by an acknowledgment (ACK) message. The INVITE request asks a "callee" to join or engage in a session with a "caller." The session may be a conference with multiple users or a simple, two-party session. After the callee agrees to participate in a call, the caller confirms that it has received response by sending the ACK message. When the caller desires to end the session, a BYE request is sent to the callee.

The INVITE request will typically contain a session description providing the callee with sufficient information to join the session. For multi-cast sessions, such as those used in conferencing, the session description defines the media types and formats that may be used or otherwise distributed in the session.

The protocol for session initiation using SIP is shown in Figure 2 for a proxy server and Figure 3 for a redirect server. In Figure 2, a proxy server 18 accepts the INVITE request from a caller computer 10 (step 100) and contacts a location service server 20 with all or part of the caller's address to determine specific address information for the invited callee computer 10 (step 102). The location service server 20 will process the information and return a specific address identifying the callee computer 10 to the proxy server 18 (step 104). The proxy server 18 will then issue an INVITE request to the callee computer 10 based on the specific address returned by the location service server 20 (step 106).

Notably, for a conference session where there are multiple callees, the proxy server 18 will send INVITES

to each of the callee computers 10 based on addresses received from the location service server 20 as necessary. A user agent server running on the callee computer 10 will alert the callee that a session is being

5   requested, and if the session is accepted by the callee, return a success indication (200 OK) to the proxy server 18 (step 108). The proxy server 18 will relay the indication to the caller computer 10 (step 110). Receipt of this indication by the caller computer 10 will result

10   in sending an ACK message to the proxy server 18 (step 112), which will forward the ACK message to callee computer 10 (step 114). Alternatively, the ACK message may be sent directly to the callee computer 10. Throughout the session, the request and responses will

15   typically have the same session or call identification.

     Session establishment using a redirect server 22 is shown in Figure 3. Initiation begins when the caller computer 10 sends an INVITE request to the redirect server 22 (step 200), which contacts the location service

20   server 20 to obtain the specific address for the callee computer 10 (steps 202 and 204). Instead of contacting the callee computer 10 directly as described above with the proxy server 18, the redirect server 22 in this embodiment returns the specific address information to

25   the caller computer 10 (step 206). The caller computer 10 then sends an ACK message to the redirect server 22 to indicate receipt of the callee computer's address (step 208) and proceeds to initiate a session with the callee computer 10 directly.

30   The caller computer 10 issues a new INVITE request to the address returned by the redirect server 22 (step 210). Similarly, the user agent server running on the callee computer 10 will inform the callee that a session is being initiated, and assuming the session is accepted

by the callee, the user agent server will send an
acceptance message (200 OK) to the caller computer 10
(step 212). The caller computer 10 will respond with an
ACK message to the callee computer 10 to finalize session

5   establishment (step 214).

          To facilitate web synchronization according to the
preferred embodiment of the present invention, users
engaged in a session allowing web synchronization will
have a WBID 16 and web browser 12 running on their

10   computer 10. The WBID 16 will initially instantiate
itself as a DDE server and define a callback method that
will receive and process DDE information received from
the web browser 12 via the API 14. Preferably, the WBID
16 will access the application registry for the computer

15   10 and determine which browser is registered as the
default web browser. The WBID 16 will then instruct the
default web browser 12 to inform the WBID 16 of URLs for
web pages loaded by the web browser 12. This may be
accomplished by opening a DDE connection and transaction

20   via API 14 with the DDE topic of "WWW_RegisterURLEcho."
The web browser 12 will preferably only send URLs for web
pages that are selected by the user and not those loaded
in response to receiving a URL from a remote user. The
web browser 12 is now configured to alert the WBID 16 via

25   the API 14 any time a new web page is loaded by the web
browser 12.

          In operation, a "caller" establishes a session with
a "callee" and passes the currently loaded URL to the
callee's WBID 16. Preferably, this is accomplished with

30   an SIP INVITE message wherein the URL information is
passed using Multipurpose Internet Message Extensions
(MIME). MIME defines a technique whereby an object can
contain a reference or pointer to data rather than having
to contain the data itself. This system is embodied in

the text/uri-list media type defined in the Internet
Engineering Task Force's RFC1521, which is incorporated
herein by reference in its entirety. In essence, MIME is
a defined way to label items to make them more amenable
5   to correct handling.

The WBID 16 of the callee acknowledges the INVITE
request by sending a "200 OK" response message back to
the caller. The WBID 16 for the caller sends an ACK
message, as described above, and the session is
10   established wherein the URL currently loaded by the
caller's web browser 12 is available to the callee's web
browser 12. Any time either the caller or the callee
traverses their web browser 12 to a new web page, the
corresponding web browser 12 will notify the WBID 16
15   application via the API 14 with a DDE client transaction
using the topic of "WWW_EchoURL" and pass the currently
loaded URL to the other WBID(s) 16 participating in the
session. Any WBID 16 receiving the update will pass the
URL to the corresponding web browser 12 via the API 14
20   wherein the web browser 12 will load the web page
corresponding to the URL.

Preferably, this is done in an SIP environment by
sending a re-INVITE with the URL information being the
only change from the initial INVITE request. When a re-
25   INVITE request is received, the WBID 16 receiving the re-
INVITE will parse the URL information and either make the
user aware that a new URL is being suggested from another
user or automatically load the suggested URL. Whether
the user is queried to load the URL or the URL ·is
30   automatically loaded into the web browser 12 is
preferably pre-configured by the user or automatically
pre-configured when the session is initiated.

The WBID 16 can automatically load the suggested URL
by issuing a DDE request of "WWW_OpenURL," which

instructs the web browser 12 to automatically load URLs
received via the API 14 from the WBID 16. If the web
browser 12 is not already opened, the WBID 16 may use the
Win32 DLL function called "shell_execute" to launch the
5   web browser 12. The web browser 12 receiving the URL
will load and display the corresponding web page so that
the caller and callee are synchronized to the same web
page.

   The flow diagram of Figure 4 details a typical
10   session between two users. Assume that web browser A and
WBID A are the web browser 12 and WBID 12, respectively,
running on user A's computer 10. Similarly, assume web
browser B and WBID B are the web browser 12 and WBID 16,
respectively, running on user B's computer. Initially,
15   WBID A and WBID B register for URL updates with web
browser A and web browser B, respectively, using the DDE
topic of "WWW_RegisterURLEcho" (steps 300 and 302). When
user A loads a new web page on web browser A (step 304),
web browser A notifies WBID A of the currently loaded URL
20   (step 306). If a session has not been initiated between
user A and user B, WBID A establishes a session with WBID
B, preferably using SIP, by sending an INVITE request
containing the current URL to WBID B (step 308). The
WBID B will respond with a 200 OK response (step 310),
25   which will trigger the WBID A to send an ACK message to
the WBID B (step 312).

   At this point, there is an active session between
the WBID A and the WBID B. Further, the WBID B has an
INVITE request containing the URL of the web page loaded
30   on web browser A. WBID B will parse out the URL from the
INVITE request and request web browser B to load the
suggested URL by sending the DDE topic of "WWW_OpenURL"
with the URL to web browser B (step 314). This request
may be an instruction to automatically load the URL or a

query to the user as to whether or not to load the URL.
In the latter case, the web browser will load the URL
only if approved by the user (step 316).

Assuming that the web page for the received URL is
automatically loaded or the user accepts the suggested
URL, web browsers A and B will contain the same web page
associated with the URL. Now assume that the user B is
the next party to select a new web page to load (step
318). At this moment, web browser B notifies the WBID B
through the API 14 of the newly loaded web page by
providing the URL associated with the web page using a
DDE topic of "WWW_EchoURL" (step 320). The WBID B will
send a re-INVITE to the WBID A to identify the loading of
the new web page at web browser B (step 322). The re-
INVITE request results in the WBID A responding with a
200 OK (step 324), which causes the WBID B to respond
with an ACK message (step 326).

The WBID A will then parse out the accompanying URL
from the re-INVITE request and instruct the web browser A
to load the suggested URL via the API 14 using the DDE
topic of "WWW_OpenURL" (step 328). At this point, the
web browser A will automatically load the web page
associated with the URL or query the user A as to whether
or not to load the web page (step 330). This process
will continue as the users traverse from one web page to
another until one of the users elects to end the session
wherein the corresponding WBID will send a BYE request to
the other WBID(s) to end the session (step 332).

Importantly, most of the description is focused on
the session between two users, but those skilled in the
art will recognize the concepts are equally applicable to
multi-user sessions where anyone or all of the computers
in the session will track and provide current URL
information. Notably, in a conference setting it may be

preferable to define a conference leader wherein other
computers in the session will track the pages loaded by
the leader.   The remaining parties may be allowed to load
new pages; however, changes by the remaining parties will

5   not be sent to the leader or others in the conference.
Alternatively, changes by the receiving parties may be
sent wherein the other parties are given the option to
load the corresponding web page.   Those skilled in the
art will recognize the multiple combinations of

10   implementing the present invention in two party sessions
as well as conference settings including more than two
parties.

     As shown in Figure 5, the web browser 16 may run on
any type of computer having a control system 24

15   associated with memory 26 having the requisite software
28 to provide the web browser 12, API 14 and the WBID 16.
The control system 24 is associated with a network
interface 30 to facilitate communications across the
network to communicate with the other computers 10.

20   Those skilled in the art will also recognize that the
functionality of the WBID 16 may be incorporated totally
within the web browser 12 and not have to be a stand
alone application, object or hardware device interacting
with the web browser 12 through the API 14.

25   As noted, the specific protocols in the software
configuration may vary based on the desired design and
implementation.   The primary purpose of the invention is
to allow users to easily share the current web page that
they are viewing with others.   When a user receives a

30   suggested URL or like location indicia, they can have the
web page automatically loaded at their browser or
optionally interact with the interface to manually load
the web page as desired.   The invention eliminates the
need to email, vocally repeat, or type web page addresses

numerous times while in a session with other users. Those skilled in the art will recognize various modifications to the present invention within the concepts disclosed herein. These concepts are considered

5 part of this disclosure and within the scope of the claims that follow.